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ABSTRACT

School systems, by and large, are hesitating in integrating new technology into the educational process. The new technology includes computers, telecommunications, electronic blackboards, interactive video for simulations, editing devices, and the new optical storage disk, the CD/ROM. Many believe the new technology can help to address such concerns as diverse population needs, equity in education, uniformity in curiculum, the shortage of qualified teaching personnel, and the need for lifelong learning and retraining experiences. School boards involved in the purchase of new technology are advised to begin with a planning committee--involving teachers--for long-range planning and to formulate a district needs assessment. Policy statements need to be made concerning equipment purchasing, ownership, use, and maintenance. Since most school systems will not have the resources for immediate, full-scale computerization, priorities must be set. Planners can move from a generalized statement to more specific curriculum, hardware, software, and staff development needs. (MLF)

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# Schools and technology: now and the future

✓ *by Debbie Demmon-Berger and T. Susan Hill*

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# Schools and technology: now and the future

*by Debbie Demmon-Berger and T. Susan Hill*

*Imagine a busy supermarket with but three checkout lanes. At the end of the first lane is a university-trained mathematician with a pad of paper and a pencil. At the second lane is a university-trained mathematician with a calculator. At the third is a high school graduate with a computer-driven scanner.*

*Which lane would you choose?*

"The world, folks, is in that third lane," declares Donna Cooper of the Clint (Texas) Independent School District as explanation for why she believes technology should be so integrated into the classroom that it engulfs the entire curriculum.

The Clint schools have indeed incorporated computers into the curriculum from kindergarten through twelfth grade. But they still represent a minority of the nation's 15,000 school systems.

## Schools lag behind

While business and industry become more computerized daily—from consumer bank machines at every corner to highly sophisticated robots performing dangerous or tedious manufacturing chores—schools, by and large, have not yet bought into it.

Why the hesitance? Some reasons are:

- Memories of teaching machines and open classrooms make the education community justly wary of new bandwagons coming around the pike;
- The new technology is expensive and school budgets are hard-pressed to accommodate the additional cost given that, on average, less than one percent of a school system's budget is allocated to instructional tools;
- There is such a confusing multiplicity of machines and software that educators and school board members often throw up their hands in dismay and buy nothing rather than try to sort through what's best;
- The technology changes so rapidly that boards fear today's investment might be obsolete a year from now;
- Change does not come easily to schools, where the prevailing attitude often is to do things in the same old tried and true ways;
- A lack of computer awareness on the part of board members and educators frequently leads to an attitude that computers don't have a viable place in the classroom anyhow.

## Schools criticized

While some school systems are moving into the new technology, most have bought a lot of "small boxes"—stand alone computers. There are probably a million or more of these in classrooms or computer labs today. Students have access to these little boxes in varying ways, but in many schools the computers are used more for computer literacy—which has varying definitions—than for anything else. One hour a week in computer lab for junior high students, perhaps some specialized classes for the secondary grades—but rarely anything even approaching the use of computers as an adjunct to the teacher in the educational process.

Many view with alarm this reluctance to embrace the new technology.

Rockwell International's Donald M. Clark declares, "It's a travesty" that kids aren't trained for what the nation is going to need in the future: 25 percent highly trained technocrats (at the M.S. and Ph.D. level) and 75 percent highly trained support staff,for which a high school diploma "just won't do."

William Norris, chairman of Control Data Corporation, goes a step further when he asserts that the use of advanced technology to improve the educational system is the biggest challenge facing the country today. U.S. education, he claims, has deteriorated to a "shocking" point, lagging behind Japan, Germany, and the Soviet Union, especially in science and math.

The National School Boards Association has responded to the challenge of the new technology by creating the Institute for the Transfer of Technology to Education (ITTE) to assist state school boards associations and local boards as they consider if and how to embrace these new tools.

## Technological solutions

There are those who believe that the many problems facing public education lend themselves uniquely to technological solutions. The concerns that many believe the new technology can help to address include:

- diverse population needs;

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- equity in education for all students;
- uniformity in curriculum;
- greater emphasis on cognitive and affective skills;
- the new learning styles of students who were born and nurtured in a technologically oriented information age;
- the shortage of qualified teaching personnel;
- the need for lifelong learning and retraining experiences;
- changing family patterns that affect society's expectations for the schools;
- society's demand for greater productivity.

Consider:

- The student with a decided scientific bent who attends a small rural school where advanced laboratory courses cannot be offered for lack of demand and co-op programs with other schools are unworkable due to distances. A computer-assisted course in advanced chemistry or physics could expand the efficiency of existing staff and individualize a program for this capable student.
- A high school where a few highly able students, working via computers in a local area network, are able to tap into the local community college facilities and work at a level beyond their classmates without having to be pulled out of regular classes.
- First graders and even kindergarten students learning to read and write poetry and stories several paragraphs and even pages long (as do youngsters in Tulsa, Okla., through the Write to Read program) using computers to offset their inability to form letters with dexterity and speed.
- Chapter I students being taught higher level thinking skills in a program, developed by Stanley Pogrow of the University of Arizona, that incorporates computers simply because students today relate better to the machines than to individual teachers.
- A young student in a chemistry lab slowly heating a chemical mixture over a bunsen burner and watching a precipitate form. Just for fun, she tries the experiment again, but with the flame turned as high as it will go. Smoke rises and, poof, the mixture disappears. Throughout the day, 200 more students do the experiment with their own variations, but when the dismissal bell rings, not one dollar has been spent on chemicals and there is no mess to clean up. Why? A computer simulated the entire experience.
- Students learning to handle sophisticated spread-sheet operations and word processing to equip them for immediate employment following graduation; others learning to program or merely becoming computer literate to equip them for the prospect of attending a college where having a computer is mandatory. Just using the public library efficiently in a few years will require facility with technology.

## Scope of new technology

What is meant by the new technology and why is it so important for school systems?

The new technology is, first and foremost, computers. But it also is telecommunications and electronic blackboards (with memory capacity and printers), and interactive video for simulations, and work-saving editing devices. Most of all, it's the new optical storage disk, the CD/ROM, which can store a 100-volume encyclopedia on a 5 1/4-inch magnetic disk.

Comments Martin Schneiderman of the Educational Testing Service (ETS) and author of the recently published book summarizing ETS' and IBM's *$8 Million Schoolhouse* project, "Because of the CD/ROM, information will become so readily available that what will become important is not information, but how to access it. Instead of dealing with secondary sources of information, even students will have easy access to primary sources."

"By the mid-1990s," predicts education futurist Christopher Dede, "our ability to process information will approach the speed of light" using computers the size of a thumbnail that will work 10 or even 100 times faster than today's PC. Coming soon—a magnetic storage bubble that, in something the size of a shoe box, will be able to store the entire contents of the Library of Congress.

Considering that the new technology is expected to become such an integral part of society and the workplace, schools are making a definitive decision simply by not making a decision.

Schools really have three choices. They can buy into the new technology. They can take a neutral stance by sitting back and waiting to see how it all evolves. Or they can make a determined effort to keep the new technology out of the classroom.

But it's a good idea to pay attention to Houston superintendent Billy Reagan when he relates how, "Twenty-eight years ago, as a 6th grade teacher, Mrs. Smith kept all her globes and maps in the closet. Since then we've had phonographs, tape recorders, and television come into the schools. They're all on the shelves gathering dust."

The lesson is obvious: Putting gadgets in the schools without a plan for their educational application guarantees they'll never be used.

## Avoid knee-jerk reactions

Microtechnology consultant Marybeth Darrow, who has helped more than 200 school boards develop a reasoned computer use policy, maintains that boards must avoid a "knee-jerk" reaction to some administrator's or parent's comment to the effect that "Computers are everywhere; we'd better do something."

Darrow and consultant Joseph Little have put together a comprehensive package of important considerations for school boards involved in the purchase

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of the new technology. Long-range planning, they maintain, is the first step and it, in turn, begins with a planning committee.

"Get people to 'buy in' to the school system's computer goals by asking everyone's advice before you adopt a policy," Darrow suggests.

The committee should have the resources to visit other school systems, to visit dealers, to attend workshops, and to have access to the latest research and trade publications, according to Darrow.

The next step is formulation of a district needs assessment, after which the committee can make recommendations to the board for action. It is important, says Darrow, that philosophical considerations such as general computer literacy versus in-depth exposure and stand-alone systems versus networks be addressed. Central to this process is "to take the pulse in your district and find out what the teachers want."

This latter step is especially important since computer use is sure to fail if the teaching staff is hostile. And hostile they well might be. "Teachers fear that computers either will replace them or make fools of them in front of their students," notes Gordon Stulberg, Polygram Corporation executive.

It's for that reason that teachers must be involved from the beginning, with sufficient inservice and practice opportunities to help them understand how to make the technology work for them, make their job more efficient, and substitute the more affective skills that most prefer for the tedious chores of teaching.

Security factors also must be addressed when school boards consider computer policies. Building and even central administrators might be hesitant to permit generalized computer use in the fear that students might be able to break into the school's data base or even into government files.

## More policy questions

Other questions addressed by a successful set of computer policies, according to Darrow and Little, are:

- Why are we using computers? Is the school system's goal to teach computer literacy to all students, to ensure employment opportunities in technical fields, or to teach higher order thinking skills? A policy answer: The board's educational philosophy statement should identify the goal or goals.
- Whose equipment is it anyway? Once a computer sits in a teacher's classroom, he often considers it his. What if, for instance, Mr. Jones' second grade class raises funds to buy a computer, then Mr. Jones transfers to a fourth grade class and wants to take the computer with him? A policy answer: Equipment purchased by or donated to the school system is school system property.
- Who may use the equipment? What if an administrator walks in and removes a computer from the classroom of a teacher who had his week's lessons planned around it? What happens when an outside group wants to borrow the school computer, or a staff member wants it for the weekend? A policy answer: During school hours, computers will be used primarily for insructional purposes; after hours, administrators and teachers may use the computers; when not used for school purposes, community organizations may borrow the computers within guidelines set by the administration.
- Who is responsible for the equipment? When equipment breaks down, no matter who is using it, who pays for it? If it is stolen or lost, who pays? A policy answer: All equipment owned by the school system will be properly insured, maintained, and inventoried. Software will be referenced—and checked out—through the school library.
- How can we buy the right equipment?A policy idea on hardware: No equipment will be bought before it has been tested. A policy on software: No software will be purchased unless it has received at least two favorable reviews by school system staff or in national magazines; it must supplement, not supplant, school curriculum.
- Is our computer program okay? An evaluation policy: Set measurable goals; allot adequate funds to support ongoing evaluation.
- What about software copies? You know students are making copies of everything; some teachers are doing it too. A policy statement: The board assures that computer use will be monitored so that neither students nor staff infringe on copyrighted software rights; the board does approve the making of one archival or master copy.

## Set priorities

Tim Grady, director of secondary curriculum for Fort Campbell (Ky.) Dependent Schools, suggests that since most school systems won't have the resources for immediate, full-scale computerization, priorities must be set.

For example, a school system might set computer literacy in grades 6-8 as a first-year priority; computer use in language arts, math, science, and social studies in grades 3-5 and in science and math for gifted and talented students in grades 4-8 as a priority for the second year; and computer science electives at the high school plus computer use for remedial work in language arts and math as a third-year priority. Planners can move from such a generalized statement to more specific curriculum, hardware, software, and staff development needs.

Cautions Stanley Pogrow: "Computers should be a carrot to rethink all school system goals and teaching methods. Don't pile them on top of what you're already doing and think everything will get better."

After all, positive application of the computer, says California consultant Richard Byrne, assumes that you're engaged in a constructive task in the first place. Computers are an efficient means of getting things done, but they're only effective if the classroom is effective to start. "There's no sense in doing something unnecessary at an accelerated rate," says Byrne. "If you're lost, you don't speed up. And if you're disorganized, Lotus 1-2-3 will only make you more so at 600 times the rate." ■